Catch marketing analysis of Frigate tuna (*Auxis thazard*): caught by lift-net at Bone District, South Sulawesi Province-Indonesia

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Abstract. Lift-net (local term: *Bagan Rambo*) is one of the most productive fishing gear in the coastal community of Gulf of Bone, including those in the Bone District. This study aims to explain the characteristics of the marketing channels of frigate tuna caught by fishermen and the effectiveness and efficiency of frigate tuna market system. The study was conducted from December 2017 to February 2018 at Bone District, South Sulawesi Province- Indonesia with a purposive sampling method of 37 units of lift-net and 481 fisheries households. The results of the study show that lift-net owners and fishmongers are the main channels of catch marketing (66.7%). For Bone sub-district of Tanete Riattang Timur 50% of catches go fishing auction and fisheries companies. The effective marketing system of frigates tuna are: 1) fishermen get more profit if they sell their catch in kg instead of selling per bucket, 2) the boat owner and fishmonger get a big profit, at the sale of a minimum price. The effective marketing channel is directly selling catches to fisheries companies.

Keywords: lift-net, Bagan Rambo, frigate tuna, Bone district

1. Introduction

Bone District at South Sulawesi Province, Indonesia consists of 10 coastal sub-districts. This geographical location impacts the livelihoods of coastal communities, most of whom are fishermen with a variety of fishing gear, one of the gears is the lift-net known as *Bagan Rambo* (local term). The existence of the lift-net contributes significantly to the regional economy. In 2017 the amount of fishery production was 367,623 tons or IDR 3,443,747,790 and 21.5% of the total value was contributed by capture fisheries[1]. The main catches at Gulf of Bone are tuna and other pelagic fish. Frigate tuna is the most catch after tuna.

One of the fishery activity centers in East Tanete Riattang (a sub-district of Bone) is in the Waetuo, Pallette and Bajoe villages with 25, 6 and 6 units of lift-net respectively and 481 households. Fishing business activities in Bone district usually carry out in groups. This group consists of fishermen (crews), boat's leader (skipper) and boat's owner or fishmonger. Boat's owner or traders play the role of capital owners, while the skipper and fishermen play a role in fishing operations, all interacting to form a pattern of social relations (client patron) in carrying out fishing business activities according to their respective roles.

During the fishing activities, all vessel operational needs including logistics, fuel, etc are covered by the vessel's owner. Fish catches obtained in one period are then divided based on principles, or a profit-sharing system that has been mutually agreed between crews and boat owners.The catch is usually marketed through marketing channels such as: retailers (small traders), medium traders, large traders, and exporters but there are some skippers who sell their catches to boat owners directly. Owners and big traders generally do marketing to big traders in fish auction places, fish processing companies or cold storage owners and they are free to choose the marketing channels that are considered the most profitable for them.

In marketing their catches, some fishermen have their own networks, they could directly sell it to boat owners or to traders and retailers. This pattern of marketing is usually done after there is an agreement between the fisherman and the boat's owner. Direct selling system to boat owners or large traders due to fishing operational cost is financed by boat owners or large traders, or in some cases if fishermen want to own or add more fishing facilities such as motorboats or fishing gear, the boat owner or traders as the capital owner provides a capital loan or facilities needed. The fisherman then pays for it by depositing the catch to be sold and the proceeds of the sale are deducted by several percents according to the agreement. On the other hand income and profits from the sale of fish to the boat's owner or big trader seems to be still relatively low compared to the selling price and the profits derived by them. Fishermen sell their catches and obtain relatively small incomes and profits whereas the boat's owner or trader always earns a much greater income and profit.

This fact shows the strength of monopsonist and oligopsonist of boat owners towards fishermen so that it is difficult to expect an effective marketing pattern. The formed market system often leads to monopsony or oligopsonistic markets [2]. Such a market system can occur due to lack of competition among traders due to the limited number of traders.

Market conditions as mentioned are not favorable for fishermen because the price will be controlled by traders who have monopsony power. In these market conditions, fishermen tend to accept low prices due to the behavior of traders who try to maximize their profits. It can be said that the marketing of commodities with monopsony or oligopsonistic power is inefficient because the interests of fishermen as producers can be disadvantaged [3]. Based on this reality, it is important to seek a marketing analyst of fishermen's catches, especially lift-net fishermen.

2. Material and methods

2.1. Time and place of research
The study was conducted in December 2017 to February 2018 at Bone District, South Sulawesi Province-Indonesia with a purposive sampling method of 37 units of lift-net and 481 fisheries households. The selection of research sites is based on considerations:
 a) East Tanete Riattang is a coastal area where most of the fishermen reside which produce large capture fisheries production,
 b) The main fishing gear is a lift-net boat with high production during the particular season, thus becoming the frigate tuna trade center for Bone and surrounding areas.
 c) In marketing the catches, fishermen have their own marketing patterns that have been passed down through generations by establishing relationships with small traders or retailers, boat owners, and large traders.
 d) Frigate tuna is deliberately chosen as a research commodity because of perishable food that requires fast handling.

2.2. Population and sample
The number of lift-net in Tanete Riattang Timur is 37 units divided into three villages, namely: Waetuo, Bajoe, and Palette respectively 25, 6 and 6 units of lift-net. The population in this study were all fishermen in Tanette Riatang Timur sub-district amounted to 481 households.

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The sampling technique was taken from 25% of each number of lift-net, obtained samples of 6, 2 and 2 lift-net representing each village. Household sampling is based on a purposive sampling technique where each lift-net consists of 6 people consisting of 1 skipper and 5 crews. While the sample for traders is taken from 15 people who are considered to represent. The total number of samples is 75 people.

2.3. Data types and sources
Data consists of primary and secondary data.

Primary data obtained directly from interviews with fishermen, fishing families, traders, companies and local governments. Whereas secondary data was obtained from literature review, documentation and data from fisheries agencies or companies.

2.4. Data collection and analysis
Data were obtained from questionnaires, interviews, observations, and documentation which were then analyzed based on a qualitative-quantitative analysis approach.

Table 1. Data analysis based on the variables

No	Intention	Variables dan Evaluation		Analysis
		Variable	Evaluation	
1	To explain the characteristics of marketing channels	1) Form of fishermen marketing channels 2) Form of owner and trader marketing channels	Characteristics of tuna frigate marketing channels	Qualitative descriptive
2	To explain effective marketing channels	1) Fisherman satisfaction 2) Trader satisfaction 3) Fishermen income 4) Profit margins from each marketing channel 5) The efficiency of marketing channels	Creation of equity and justice as well as an increase in fishermen's incomes	Qualitative descriptive Deductive method

3. Result and discussion

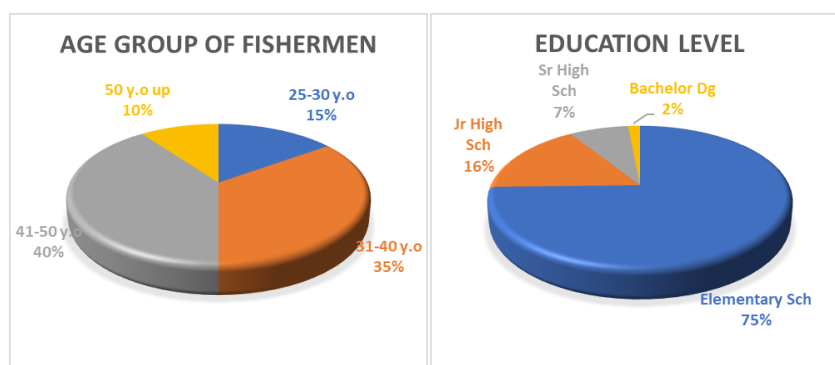### 3.1. Social characteristic

Figure 1. Social characteristics of fishermen based on the age and education level

3.1.1. Age group. Generally, lift-net fishermen are very experienced fishermen, this can be seen from the age group that dominates this work, 40% are those aged between 41-50 years old followed by the age group 31-40 years old (35%). These two age groups dominate the work as lift-net fishermen. This age group is considered as a productive age group and consists mostly of ordinary crews and there are

even some of them who are not married. This reflects the amount of interest among young fishermen to pursue their work as lift-net fishermen. While the other 25% in the age group is 50 years old and above, most of those who still work as lift-net fishermen are due to their ability and position; generally this age group is skippers.

3.1.2. Education. 75% of lift-net fishermen only have elementary school education and some are not finished. The rest have attended school at an advanced level. Lift-net fishermen with low education are mostly ordinary crews who have no other choice in looking for work and are willing to leave school for work. Whereas for fishermen with higher education level, generally, they are skippers or big traders, although in fact some skippers and traders also graduated from elementary school. This proves that to be a lift net fisherman does not require expertise or formal education requirements.
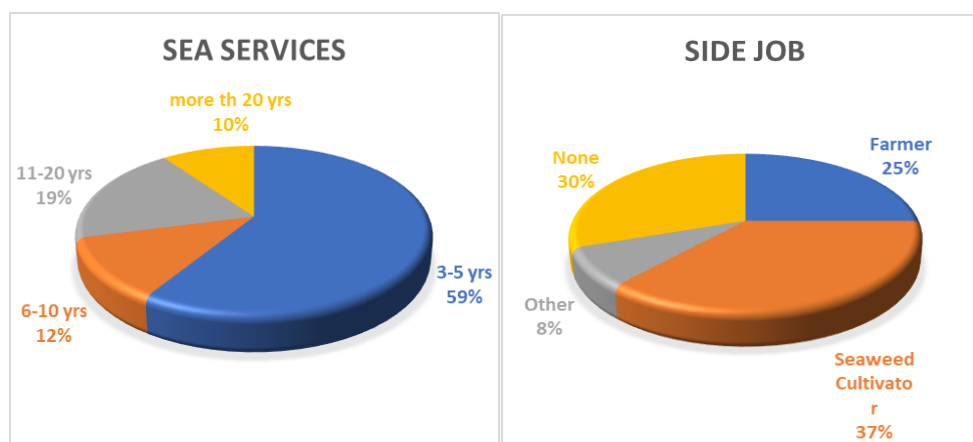

Figure 2. The experiment of fishermen based on the sea service duration and side job

3.1.3. Sea services. The fishing experience of fishermen in Bone district varies from 3 to 40 years, but especially for lift-net fishermen, the longest experience of fishermen managing lift-net is equivalent to the age of this fishing gear developing in the Bone area which is around 30 years. More than half of fishermen have been engaged in business between 3-5 years, while the rest between 6-20 years. The 11-20 year age group is a group where their position on the boat is as a leader or skipper, and if they work on land most of them are lift-net owners or big traders who usually buy the lift-net catch. *d) Side jobs.* In order to fulfill their daily needs, fishermen do not only rely on their income from catches, among crews and skipper having side jobs such as land farmers, seaweed farmers, traders, etc. But some of them don't have any side jobs at all. Some crews have side jobs as farmers (25%), while another 36.6% which consists of skippers, boat's owners and crews have side jobs as seaweed farmers. The remaining 8% have jobs as traders of production facilities (fuel, net, and ice), wood traders, workshops and so on. Skippers and crews who do not have side jobs is 36%. *e). Dependants and wife's role.* Respondents in this study are fishermen who are married, so they have dependents between 1 to more than 6 people. 46.7% of fishermen have dependents of 4-6 people, 28.3% have dependents of more than 6 people and 25% have dependents between 1-3 people. To help support the family income, a fisherman's wife sometimes makes a living. But there are also many fishermen wives who only take care of homework.
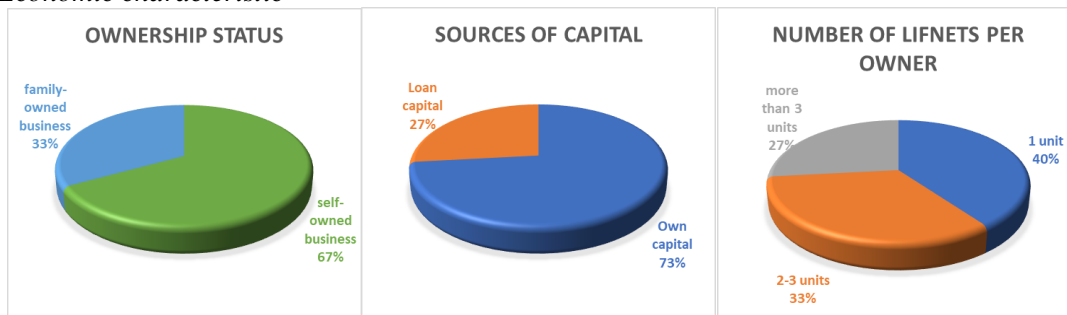
3.2. Economic characteristic

Figure 3. *Economic characteristics based on the ownership status, sources of capital, and number of lift nets per owner*

3.2.1. Status of ownership. A large investment value makes not all fishermen are able to have a lift-net. Owners who have lift-net are those who have capital from selling their previous fishing gear or from their yearly saving while being a fisherman. sources of capital ranging from owner's money or loans.

3.2.2. Capital. Mostly, the operational costs (73%) are from owners' personal money, the rest is a loan from big traders. Fishermen are not interested in borrowing money from banks or cooperatives because administrative requirements are considered difficult.

3.2.3. Owner. Although the investment value of the lift-net is quite large, there are some fishermen who have more than 1 unit of the lift-net

3.2.4. Business Scale. In general, lift-net in East Tanete Riattang is medium and small size, some of the larger ones come from other areas such as Palopo. 89% are small and medium-sized and 11% is big.
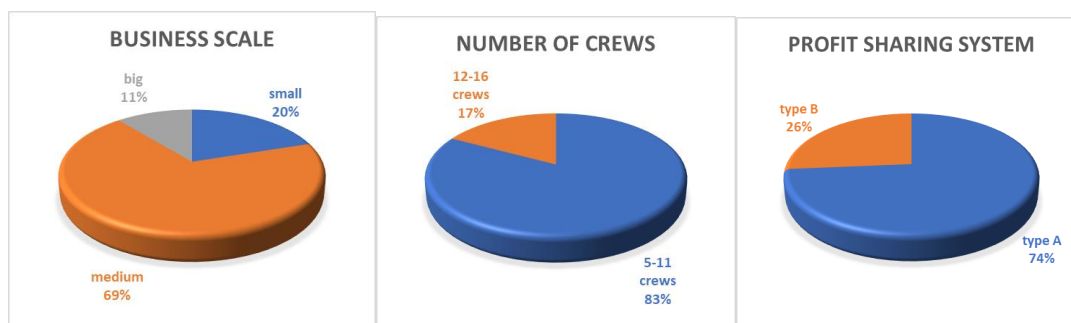

Figure 4. Business scale

What's interesting is although they differ in size, all lift-nets use the same electric power with a 20 KVA generator which is different from lift-nets in the Barru and Luwu regions[4]. As commonly known lift-net is generally operated at night with the help of lights as a fish attraction[4]. Bone fishermen consider that the size of the lift-net that they use is in accordance with their desires, capital capability and target of catches. Likewise with the number of lights used to attract the attention of fish, an average of using 250-watt lamps is 20-30 pieces. *e) Crews. In operation,* lift-net is operated by a skipper and crews. There is no standard number of crew in one boat.The average number of crews (82%) is 5-11 people while the rest are operated with a crew of 10-16 people.   *f) Profit sharing system.* There are 2 profit-sharing systems that are commonly used by fishermen to divide the profits from their catch. First the net income is deducted by 10% and the remainder is divided into crews (model A), the second is net income directly divided to crews (model B). 73% of Bone fishermen use system A in profit sharing catches.
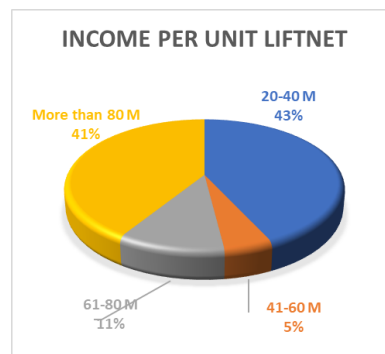
Figure 5. The income per unit lift net

3.2.5. Income. The income of lift-net fishermen varies depending on the season, fishing ground area and boat size. Around 71.4% have income between 22 and 40 million, 14.3% have income between 44-80 million, 8.0% have an income of 49 million and the remaining 5.7% have income of more than 49 million (all in IDR, Indonesian Rupiahs). These results are based on observations when the peak season approaches, between January and February. The size of the lift-net and the number of trips per month also has an influence on the amount of revenue.

Profit-sharing is based on an agreement between crews and the shipowner. The agreement has been made before the ship conducts operational activities. There are three revenue sharing groups: crews, skipper and boat owners. Crews are the group with the most members but the least in getting profit-sharing, their main task is as a fishing gear operator. The second group is the skipper, as a leader in fishing operations and responsible for the recruitment of crews, this group gets the most profit-sharing among crews based on their job responsibilities. The third group is boat owners who get half the profit income.

3.3. Analysis of market channels

Table 2. Analysis of market channels

Production volume	Marketing channel	Marketing method
33-330 kg	Small Traders	Directly
330-1000 kg	Medium Traders, Fishmongers	Through owner
1000-1500 kg	Owners	Directly
1500-3300 kg	Owners or Big Traders	Directly
More than 3300 kg	Owners	Directly

Based on production volume. Lift-net fishermen basically have an agreement where they will sell their catch. The selling place will based on fish caught. As in the table, if the number of catches is small, direct sales are made to small traders and local market traders. If the catch exceeds 330 kg, the boat owner will enter the sales system. The owner will determine the next sale whether it will be sold to cold storage companies in the Makassar industrial area or sell through intermediary traders. Interview with respondents: 18.3% fishermen prefer to sell their catch directly to medium traders or fishmongers if the catch is less than 1000 kg, 55.5% of big traders only want to buy fish in large quantities and 10% fishmongers or middle traders buy catch between 330 - 1000 kg depends on their financial.

Meanwhile according to fishermen, the marketing channels they want will also be based on the number of catches. 10% of them will sell their cacthes to small traders or local markets if less than 330 kg. 18.3% will sell their catches to small scale fish traders or fishmongers. 66.7% will sell their fish to big traders for catches between 1000 and 3300 kg. While 5% of fishermen choose to sell their fish to fish industries or cold storages companies at Makassar industrial areas for cathces than more than 3300 kgs

Table 3. Marketing channels based on the fishermen opinion

Fishermen Opinion	Frequency	Percentage
Local market	6	10
Small traders, fishmongers	11	18.3
Big traders	40	66.7
Exporter, fish industries, Kima	3	5
Total	60	100

The market system in Bone district is simple, fishermen sell their fish per bucket not per kg. This system is used because easy for transporting their catches from ships to transporters. One full bucket is approximately 33 kg. This system sometimes detrimental to fishermen because the weight is not same for each bucket. Fluctuations in fish prices will also affect the fishermen profits. During the peak season the catches are sold at a low price, the profit-sharing that will be received by fishermen will also be small, while the traders can get higher profit after they selling to maximize price.

4. Conclusion

Marketing channel of frigate tuna by lift-net of Bone fishermen 66.7% goes to lift-net owners or big traders. From here the owners will determine the next step where their fish will be sold and 50% of the owners will sell their catch to big traders at auction places or to fish industries at Makassar. Furthermore, if the catches are small in amount, the owners or skippers prefer to sell their catch to small scale traders in local market or to small scale fishmongers. In East Tanete Riattang 50% of catches go to fish auction and fisheries companies. The effective marketing system of frigates tuna are: 1) fishermen get more profit if they sell their catch in kg instead of selling per bucket, 2) the owner of the lift-net and fishmonger gets a big profit, at the sale of a minimum price. For better price and effective marketing channel, the fishermen should directly sell their catches to fisheries companies.

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